# Water Resources Investigations

| Subactivity | 1999 Estimate | Uncontrol. & Related Chgs | Program | Program Changes | FY 2000 Budget Request | Change from 1999 |
|---|---|---|---|---|---|---|
| Water Resources Assessment & Research | 104,433 | 3,144 | -19,453 | 174 | 88,298 | -16,135 |
| Water Data Collection & Management | 29,528 | 1,002 | -10,048 | 308 | 20,790 | -8,738 |
| Federal-State Coop Water Program | 70,137 | 2,177 | -11,458 | -2,500 | 58,356 | -11,781 |
| Water Resources Research Act Program | 5,055 | 7 | 0 | 0 | 5,062 | 7 |
| Total Requirements $000 | 209,153 | 6,330 | -40,959 | -2,018 | 172,506 | -36,647 |

Note: The Program Redirect column reflects the redirection of funds to the Integrated Science, Science Support, and Facilities activities.

## Activity Summary

### Introduction

Through its Water Resources Investigations, the USGS is responsible for continuously assessing the Nation's ground water and surface water resources, and providing reliable, impartial, timely information that resources managers need to understand the Nation's water resources. Through a national program of partnerships, information sharing, and technical assistance, the USGS actively promotes the use of water resources information by decision makers to:

- Minimize the loss of life and property as a result of water-related hazards such as floods, droughts, and land movement.
- Protect and enhance water resources for human health, aquatic health, and environmental quality.
- Effectively manage ground-water and surface-water resources for domestic, agricultural, commercial, industrial, recreational, and ecological uses.
- Contribute to wise physical and economic development of the Nation's resources for the benefit of present and future generations.

This mission is accomplished through several key activities which relate to the USGS strategic goals in the areas of Hazards and Environment and Natural Resources:

- Contributing to reducing loss of life and property, moderating the impacts of floods, and improving flood disaster response — Emergency management and public safety officials need accurate forecasts of floods to make evacuation decisions, as well as decisions on where to focus flood-fighting efforts. The National Weather Service relies on streamflow information from USGS streamgages in making its flood forecasts. USGS information on the discharge, height, and velocity of potential floods is also used by transportation agencies and engineering firms to help design bridges and roadways.

***New Method Produces Better Flood Maps At Much Lower Cost***

USGS researchers have developed a digital mapping technique to produce updated flood inundation maps with greater accuracy and detail using geographic information system computer programs. This new method can reduce the cost of updating maps by as much as 80 percent. Additional information is available in a report entitled, "Updating flood maps efficiently--Building on existing hydraulic information and modern elevation data with a GIS," which is available on the Internet at:

**http://wwwdwatcm.wr.usgs.gov/reports/floodgis/**

- Assisting public officials and the private sector in developing, evaluating, and implementing cost-effective strategies for sustaining and restoring the environment — Federal, State, and local water managers need information that identifies the relative contributions of contaminants to rivers and ground water from specific sources. Our Nation's waters can be polluted from point sources (such as chemical spills), non-point sources (such as urban runoff, fertilizers, manure, mining activity), atmospheric deposition (acid rain and particulates), and natural geologic conditions. USGS water quality information has been influential in setting new policies on water quality issues, safeguarding public health, and reducing water resource costs.

- Helping water resource managers and public officials develop, evaluate, and implement improved, cost-effective, and balanced water resource management — USGS information on availability and use of surface water and ground water is used by Federal, State, and local water resources agencies and the private sector to determine:

    - how pumping from water supply wells affects the flow and quality of water in nearby wells, springs, and streams,

    - how land applications and waste disposal affect the availability and quality of water,

    - how the reliability of water supplies can change as a result of changes in water demand, dam operations, land use, and climate, and

    - how well-designed monitoring strategies provide cost-effective methods of protecting sources of drinking water.

- Organizing, archiving, and disseminating water data and information consistently, so that all potential users are aware of and can acquire the water information — The USGS collects, compiles, and distributes water information in all 50 States, Puerto Rico, and

Guam. The data have value both in real-time for flood forecasting operations and water allocation for use in planning and evacuation, and as historical records documenting long-term variations in streamflow, ground-water levels, and water quality. These data are stored in nationally-consistent databases in each State. In addition, the data are distributed in annual reports to water resource agencies, universities, libraries, and private citizens.

A large part of the USGS mission is getting the data and information resulting from USGS studies into the hands of the people who need it. USGS water resources investigations and research result in about 1,200 published reports per year, ranging from segments of the National Ground Water Atlas to fact sheets targeted to a non-technical audience. In addition to interpretive reports, USGS water publications also describe field procedures and protocols which provide guidance for the collection of scientifically sound water resources information by others. Significant recent publications, many of which are available electronically to the public, deal with the collection of ground water, sediment, and tissue samples for chemical analysis.

***Feedback from Users of USGS Water World Wide Web Sites***

"I have some relatives in the [New Orleans] area, and I was trying to keep track of [Hurricane] Georges, and I thought a possible source of information might be the Water Resource stream gauging program. I worked with gauge data on a number of hydrological modeling projects about 20 years ago in South Louisiana when I was associated with LSU's Coastal Studies Institute. I thought it was a LONG shot that I would find real-time water levels, let alone what appears to be about complete coverage of all the major stations. I have worked in Information Systems for most of the intervening time, and I have to say, with some understanding of the level of effort involved, that I was astonished at what you have done here! ... This is certainly another feather in the USGS's cap . . . . I would like to use your site as an example with customers and colleagues of how it IS possible to make LARGE amounts of complex information available to great numbers of people in essentially real time. Thank you all."

In the past few years, the USGS has expanded the access and distribution of hydrologic data and information to a much larger client base by making information available on the WWW. Near real-time streamflow data from more than 4,000 stations are available nationwide, and users download about 250,000 real-time hydrographs each month. Historical daily streamflow data for more than 19,000 stations are also online. The water websites have proven very popular not only with traditional customers such as water managers and engineers, but also with whitewater boaters and fishermen. USGS research has also resulted in the development of mathematical models that are used to predict the behavior of water, heat, and a wide range of contaminants in surface water and ground water. These models are available for free on the WWW and are used by scientists and engineers in the private sector, academia, and other government agencies.

All these efforts are carried out through four Water Resources Investigations subactivities: Water Resources Assessment and Research; Water Data Collection and Management; the Federal-State Cooperative Water Program, in which USGS performs work in cooperation with State and local agencies, with the States providing at least one dollar for every Federal dollar appropriated; and the Water Resources Research Act Program, an external grants program which provides funds to universities nationwide.

## FY 2000 Program Highlights

| | ($000) Program Change |
|---|---|
| Real-Time Hazards | +3,000 |
| Research & Monitoring for Amphibians | +1,000 |
| Hypoxia in Mississippi River/Gulf of Mexico | +400 |
| Comm/Fed. Info Partnership | +250 |
| Hydrologic Networks & Analysis | -3,342 |
| Federal-State Coop Program | -2,500 |
| Water Resources Assessment & Research | -826 |

The FY 2000 Budget Request for the Water Resources Investigations includes $4.65 million in program increases and $6.67 million in proprosed program decreases. Program increases are proposed for the Toxics Program ($1.0 million for Amphibians), Hydrologic Networks and Analysis Program ($3.0 million for Real-Time Hazards and $0.4 million for hypoxia), and Water Information Delivery ($0.25 million for C/FIP). Program reductions are proposed for Hydrologic Networks and Analysis ($3.342 million), Federal-State Cooperative Program ($2.5 million) and within the Water Resources Assessment and Research Subactivity ($0.526 million for Toxics and $0.3 million for Hydrologic Research and Development).

**Real-Time Hazards** ($3.0 million) — The centerpiece of the water resources program for FY 2000 is the increase for Real-Time Hazards. In recent years, the USGS has updated its capabilities to allow real-time access to streamflow data at more than 4,000 sites across the Nation. This real-time capability provides the National Weather Service and emergency response agencies with greatly improved capability for flood warning and more timely assessments of whether evacuation may be necessary in flooded areas. The $3.0 million requested for FY 2000 under the water resources portion of the Real-Time Hazards effort will allow the USGS to accelerate this effort, so that real-time capability can be added to even more streamgaging sites, and so that stage-discharge ratings and other tools can be improved to help emergency officials better predict extreme events such as 100-year floods.

**Research and Monitoring for Amphibians as an Indicator Species** ($1.0 million) — The proposed increase will provide water quality monitoring support for an interdisciplinary investigation to assess the scope, severity, and cause of amphibian declines in the U.S., and to gather information that will lead to formulation of effective actions to arrest or reverse declines. The increase is part of a multidisciplinary effort with the National Mapping Program and Biological Research activities.

**Hypoxia in the Gulf of Mexico and the Mississippi River ($0.4 million)** — The proposed increase will expand research on hypoxia with high priority on improving the monitoring network and scientific methods for identifying nutrient sources and the associated land uses.

**Community/Federal Information Partnership ($0.25 million)** — To make water data more accessible and interchangeable for improved watershed management, the proposed C/FIP increase will accelerate standardized referencing of stream and watershed locations throughout the Nation. The total USGS effort of $10.0 million is discussed in the General Statement.

**Program decreases ($6.67 million)** — Program decreases include -$826,000 in the Water Resources Assessment and Research Subactivity for a regional mercury assessment and research on subsidence. The Hydrologic Networks and Analysis Program is being reduced by

$3,342,000; this will eliminate direct line item support for the development and testing of hydrologic instruments, stop funding for gaging activities in support of water-quality monitoring of Lake Champlain, eliminate funding as a result of completing evaluation of ground water monitoring well site on Molokai, Hawaii, discontinue endocrine disruption studies at Lake Meade, Nevada, and reduce funding for watershed modeling studies. Finally, there is a $2.5 million decrease in the Federal-State Cooperative Water Program which will eliminate funding for water quality monitoring and assessment partnership activities.

## Federal Role

The USGS Water Resources Investigations Activity is the primary source of scientific information on one of the Nation's most important natural resources--water. The Activity fulfills a unique Federal role by providing standardized, objective information for the entire country through long-term hydrologic data, interpretive reports, and new analytical methods. Under the authority of Office of Management and Budget Memorandum 92-01, the USGS has the primary responsibility for coordinating water data activities in the Federal Government. Because river basins and aquifers cross many jurisdictional boundaries there is great efficiency in having one national agency provide standardized regional water information to all interested groups through cost-sharing arrangements.

In addition, because many water issues involve interjurisdictional disputes, it is very important that the data and conclusions be viewed as credible by all parties involved. This includes adjudication of water rights within a State, among States, or at international boundaries. The USGS is accepted as a credible source by parties involved in disputes. The USGS provides standardized information to all, making it unnecessary for each State or locality to create its own infrastructure for data collection, data handling, interpretation, and information dissemination. The basis for this national information program is analogous to the basis for other national information agencies such as the National Weather Service and National Centers for Disease Control and Prevention.

To promote management efficiency, sharing of common resources, and valuable interaction among scientific disciplines, the USGS has organized water resources research activities into a National Research Program, which has existed as an organizational element of the USGS since the late 1950's. Support for water resources research and methods development is provided from nearly all of the major program elements/line items of the USGS Water Resources Investigations Activity. Discussions of research activities are included in the budget justification narratives for each of these line items. Additional funds for the National Research Program are provided through reimbursements from other Federal agencies to support research.

## Customers and Partnerships

The USGS relies on more than 1,200 State and local partners and about 30 Federal partners in developing its water information. In FY 1998 the $194.9 million appropriation for the USGS Water Resources Investigations Activity was leveraged with $191 million in reimbursements ($99.2 million from State and local agencies and $91.8 million from other Federal agencies) to

advance the knowledge of the Nation's water resources. Under the USGS Federal-State Cooperative Water Program, State and local agencies provide at least 50 percent of the project funding. The Cooperative Program has led to much of today's knowledge of streamflow and ground water supplies, and water-quality status and trends. Because the data and reports produced by the program are available to all, they provide benefits (to Federal and non-Federal interests) far beyond the needs of the specific partners.

The USGS also serves, on a reimbursable basis, as the primary source of hydrologic information to many other Federal agencies and to American Indian/Alaska Native governments. For example, the USGS provides to the Department of Energy most of the hydrologic and geologic capability for evaluating the suitability of Yucca Mountain (Nevada) as the site of the Nation's high-level nuclear waste repository. The USGS collects data for Federal water management agencies (the Army Corps of Engineers and Bureau of Reclamation). The USGS also conducts studies at the request of many land and water management agencies. These studies include research on optimal management of dams (such as Glen Canyon Dam) and evaluation of aquatic habitat changes due to water regulation and consumption. The USGS characterizes the hydrogeologic settings for use by the Department of Energy, Department of Defense, and the U.S. Environmental Protection Agency (EPA) at many sites where they have responsibility for ground-water contamination cleanup.

USGS participation prevents the need to duplicate a hydrologic staff in these agencies and assures that the collected data will be entered into a standardized national database so the data will be documented and readily available to all potential users. The diverse programs with other Federal agencies result in new techniques and capabilities that are then put to use in the appropriated programs of the USGS and in the Cooperative Program with the States.

## Government Performance and Results Act

**Performance Targets** — The following table represents the performance elements contributed by this budget activity to the two GPRA Program Activities provided in aggregate in Exhibit A of the Performance Plan. Linkages of budget and performance are further discussed in the FY 2000 Annual Performance Plan.

| GPRA Program Activity | **Hazards** | | | | |
|---|---|---|---|---|---|
| Goal Code | 01.01.01. 01.00 | 01.01.01. 02.00 | 01.01.01. 03.00 | 01.01.01. 04.00 | 01.01.01. 05.00 |
| Performance Measure | Monitoring Networks maintained | Risk Assess-ments delivered | Real-time Streamgages (cumulative) (rate 100/yr) | Real-time Earthquake Sensors (cumulative) (rate 20/yr) | Stake-holder Meetings |
| Bureau FY 98 Baseline | 6 | 16 | 4,571 | 100 | 16 |
| Bureau FY 99 Annual Target | 6 | 14 | 4,671 | 120 | 16 |
| Water Resources Investigations | 1 | 5 | 4,671 | 0 | 6 |

| GPRA Program Activity | Hazards | | | | |
|---|---|---|---|---|---|
| Goal Code | 01.01.01. 01.00 | 01.01.01. 02.00 | 01.01.01. 03.00 | 01.01.01. 04.00 | 01.01.01. 05.00 |
| Performance Measure | Monitoring Networks maintained | Risk Assess-ments delivered | Real-time Streamgages (cumulative) (rate 100/yr) | Real-time Earthquake Sensors (cumulative) (rate 20/yr) | Stake-holder Meetings |
| Bureau FY 00 Annual Target | 6 | 12 | 4,921 | 200 | 27 |
| Water Resources Investigations | 1 | 5 | 4,921 | 0 | 6 |

| GPRA Program Activity | Environment & Natural Resources | | | | |
|---|---|---|---|---|---|
| Goal Code | 02.01.01. 01.00 | 02.01.01. 02.00 | 02.01.01. 03.00 | 02.01.01. 04.00 | 02.01.01. 05.00 |
| Performance Measure | Long-term data collection & mngmnt efforts maintained & improved & large data infrastructures supported | New system-atic analyses & investiga-tions delivered | Decision support systems or predictive models developed or improved & delivered to customers | University-based partner-ships for natural systems analysis | Stake-holder Meetings |
| Bureau FY 98 Baseline | 40 | 865 | 5 | 270 | 212 |
| Bureau FY 99 Annual Target | 40 | 843 | 6 | 272 | 228 |
| Water Resources Investigations | 4 | 404 | 1 | 56 | 88 |
| Bureau FY 00 Annual Target | 36 | 875 | 7 | 272 | 241 |
| Water Resources Investigations | 4 | 404 | 1 | 56 | 88 |